Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (original) A method for removing a material covering an alignment mark on a substrate, comprising:

mounting the substrate onto a stage in a focused ion beam system, said focused ion beam system having a non-liquid metal ion source;

directing an ion beam at the material covering an alignment mark, said ion beam having a beam current greater than 300 nanoamps and directed at an oblique angle relative to the surface of the substrate; and

removing said material by ion beam sputtering.

2. (original) The method of claim 1 in which the focused ion beam system has a plasma ion source.

3. (original) The method of claim 1 in which the ion beam is directed at an angle less than 80° relative to the substrate surface normal.

4. (original) A method for removing a material covering an alignment mark on a substrate, comprising:

directing a charged particle beam at the material covering an alignment mark; and

removing said material by charged particle beam sputtering without using an etch assisting gas.

5. (original) The method of claim 4 in which the charged particle beam is a focused ion beam.

6. (original) The method of claim 5 in which said focused ion beam is a beam of noble gas ions.

7. (original) The method of claim 5 in which said focused ion beam is selected from the group consisting of an argon ion beam, a krypton ion beam, and a xenon ion beam.

8. (original) The method of claim 4 in which the charged particle beam is directed at an oblique angle relative to the surface of the substrate.

9. (original) The method of claim 4 in which the charged particle beam is directed at an angle of between 40° and 80° relative to the substrate surface normal.

10. (original) The method of claim 4 in which the charged particle beam has a beam current of 300 nanoamps to 20,000 nanoamps.

11. (original) The method of claim 4 in which the charged particle beam has a beam current of 1500 nanoamps to 5000 nanoamps.

12. (original) The method of claim 4 in which the substrate is a silicon wafer.

13. (original) The method of claim 4 in which the material covering an alignment mark is a metal film.

14. (currently amended) An apparatus for removing a material covering an alignment mark on a substrate, comprising:

a device ~~for~~ to loading the substrate;

a device ~~for~~ to aligning the substrate;

a device ~~for~~ to positioning the substrate;

a charged particle beam system having a charged particle source suitable for emitting a charged particle beam, an optical system ~~for~~ to focusing the charged particle beam, and a computer controlled beam deflector to position the charged particle beam;

a device for controlling the charged particle beam dose applied to said material;

computer accessible memory in communication with said device to position the substrate and said device to control the charged particle beam dose applied to said material, the memory storing computer instructions for:

(i) directing a charged particle beam at material covering an alignment mark; and

(ii) removing said material by charged particle beam sputtering without using an etch assisting gas; and

a device ~~for~~ to unload~~ing~~ the substrate.

15. (original) The apparatus of claim 14 in which the charged particle beam system is a focused ion beam system.

16. (original) The apparatus of claim 14 in which the charged particle beam system is a noble gas ion beam system.

17. (original) The apparatus of claim 14 in which the charged particle beam system is selected from the group consisting of an argon ion beam system, a krypton ion beam system, and a xenon ion beam system.

18. (original) The apparatus of claim 14 in which the charged particle beam is directed at an oblique angle relative to the surface of the substrate.

19. (original) The apparatus of claim 14 in which the charged particle beam is directed at an angle of between 40° and 80° relative to the substrate surface normal.

20. (original) The apparatus of claim 14 in which the charged particle beam has a beam current of 300 nanoamps to 20,000 nanoamps.

21. (original) The apparatus of claim 14 in which the charged particle beam has a beam current of 1500 nanoamps to 5000 nanoamps.

22. (original) The apparatus of claim 14 in which the device for aligning the substrate comprises an optical microscope.

23. (new) An apparatus for removing a material covering an alignment mark on a substrate, comprising:

(a) a device to load the substrate;

(b) a device to align the substrate;

(c) a device to position the substrate;

(d) a charged particle beam system having a charged particle source suitable for emitting a charged particle beam, an optical system to focus the charged particle beam, and a computer controlled beam deflector to position the charged particle beam;

(e) a device to control the charged particle beam dose applied to said material;

(f) a device for unloading the substrate; and

(g) computer accessible memory in communication with devices (a) through (g), the memory storing computer instructions for:

(i) directing a charged particle beam at the material covering an alignment mark; and

(ii) removing said material by charged particle beam sputtering without using an etch assisting gas.

24. (new) A method for removing a material covering an alignment mark on a substrate, comprising:

mounting the substrate onto a stage in a focused ion beam system, said focused ion beam system having an ion column with an optical axis and a non-liquid metal ion source;

directing an ion beam at the material covering an alignment mark, said ion beam having a beam current greater than 300 nanoamps and said optical axis forming an oblique angle relative to the substrate surface normal; and

removing said material by ion beam sputtering without using an etch assisting gas.